

Kurt Michael Fraser, PhD

Assistant Professor (as of August 2024)

Department of Psychology

University of Minnesota

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EDUCATION

Doctor of Philosophy and Master of Arts, Biopsychology

Johns Hopkins University, 2015-2021

Bachelor of Science with Honors and Distinction, Neuroscience

University of Michigan, 2011-2015

RESEARCH EXPERIENCE

Postdoctoral Fellow

2021 – 2024

Lammel Lab, Department of Molecular & Cell Biology

University of California Berkeley

My research focuses on delineating heterogeneity in neurotransmitter release in the striatum and its impact on behavior by making use of chemogenetics, optogenetics, electrophysiology, fiber photometry, anatomical tracing, and behavioral assays.

Mentor: Stephan Lammel, PhD

Predocctoral Fellow

2015 – 2021

Janak Lab, Department of Psychological & Brain Sciences

Johns Hopkins University

My PhD work focused on the neurobiology of motivation with an emphasis on dopamine's function. I used optogenetics, intracranial pharmacology, and *in vivo* electrophysiology in combination with sophisticated behaviors to understand the role contexts play in shaping our desires.

Mentor: Patricia H. Janak, PhD

Research Assistant

2013 – 2015

Flagel Lab, Molecular & Behavioral Neuroscience Institute

University of Michigan

My undergraduate research focused on the function of dopamine receptors and the role of the paraventricular thalamic nucleus in promoting Pavlovian reward learning.

Mentor: Shelly B. Flagel, PhD

RESEARCH SUPPORT AND FELLOWSHIPS

2021-2024

NIH BRAIN Initiative NRSA F32 Postdoctoral Fellowship

F32MH127792

Role: Principal Investigator

2019-2021

NIH NIDA NRSA F31 Predocctoral Fellowship

F31DA046136

Role: Principal Investigator

PUBLICATIONS

Google Scholar Profile: <https://scholar.google.com/citations?user=MNYrIXIAAAAJ&hl=en>

Fraser, K.M., Collins, V., Wolff, A., Ottenheimer, D.J., Bornhoft, K.N., Pat, F., Chen, B.J., Janak, P.H., Saunders, B.T. (2023) Contexts facilitate dynamic expected value encoding in the mesolimbic dopamine system. *bioRxiv & in review, Current Biology*.

doi: 10.1101/2023.11.05.565687

Fraser, K.M.*, Kim, T.H.*, Castro, M., Drieu, C., Padovan-Hernandez, Y., Chen B.J., Pat, F., Ottenheimer, D.J., Janak, P.H. (2024) Encoding and context-dependent control of reward consumption within the central nucleus of the amygdala. *iScience*.

doi: 10.1016/j.isci.2024.109652 *Co-first authors

de Jong, J.W., Liang, Y., Verharen, J.P.H., **Fraser, K.M.**, Lammel, S. (2024). State and temporal derivative encoding in parallel mesoaccumbal dopamine pathways. *Nature Neuroscience*.

doi: 10.1038/s41593-023-01547-6

Fraser, K.M.*, Chen B.J.*, Janak, P.H. (2023) Nucleus accumbens and dorsal medial striatum dopamine and neural activity are essential for action sequence performance. *European Journal of Neuroscience*.

doi: 10.1101/2023.04.17.537212 *Co-first authors

Fraser, K.M., Pribut, H., Janak, P.H., Keiflin, R. (2023) From prediction to action: dissociable roles of ventral tegmental area and substantia nigra dopamine neurons in instrumental reinforcement. *Journal of Neuroscience*.

doi: 10.1523/jneurosci.0028-23.2023

Fraser, K.M., Janak, P.H. (2023) Basolateral amygdala and orbitofrontal cortex, but not dorsal hippocampus, are necessary for the control of reward-seeking by occasion setters. *Psychopharmacology*.

doi: 10.1007/s00213-022-06227-0

de Jong, J.W.*, **Fraser, K.M.***, Lammel, S. (2022) Mesoaccumbal dopamine heterogeneity: What do dopamine release and firing have to do with it? *Annual Review of Neuroscience*.

doi: 10.1146/annurev-neuro-110920-0119 *Co-first authors

Ottenheimer, D.J., Wang, K., Tong, X., **Fraser, K.M.**, Richard, J.M., Janak, P.H. (2020) Reward activity in ventral pallidum tracks satiety-sensitive preference and drives choice behavior. *Science Advances*.

doi: 10.1126/sciadv.abc9321

Ottenheimer, D.J., Bari, B.A., Sutlief, E., **Fraser, K.M.**, Kim, T.H., Richard, J.M., Cohen, J.Y., Janak, P.H. (2020) A quantitative reward prediction error signal in the ventral pallidum. *Nature Neuroscience*.

doi: 10.1038/s41593-020-0688-5

Fraser, K.M., Janak, P.H. (2019) Occasion setters attain incentive motivational value: implications for contextual influences on reward-seeking. *Learning & Memory*.

doi: 10.1101/lm.049320.119

Fraser, K.M., Janak, P.H. (2019) How does drug use shift the balance between model-based and model-free control of decision making? *Biological Psychiatry*.

doi: 10.1016/j.biopsych.2019.04.106

Fraser, K.M., Holland, P.C. (2019) Occasion setting. *Behavioral Neuroscience*.

doi: 10.1037/bne0000306

Fraser, K.M., Janak, P.H. (2018) Stressing the other paraventricular nucleus. *Nature Neuroscience*.
doi: 10.1038/s41593-018-0178-1

Fraser, K.M., Janak, P.H. (2017) Long-lasting contribution of dopamine in the nucleus accumbens core, but not dorsal lateral striatum, to sign-tracking. *European Journal of Neuroscience*.
doi: 10.1111/ejn.13642

Haight, J.L., Fuller, Z.L., **Fraser, K.M.**, Flagel, S.B. (2017) A food-predictive cue attributed with incentive salience engages subcortical afferents and efferents of the paraventricular nucleus of the thalamus. *Neuroscience*.
doi: 10.1016/j.neuroscience.2016.10.043

Fraser, K.M., Haight, J.L. (2017) Diminished dopamine: timing, neuroanatomy, or drug history? *Journal of Neuroscience*.
doi: 10.1523/jneurosci.0731-16.2016

Fraser, K.M., Haight, J.L., Gardner, E.L., Flagel, S.B. (2016) Examining the role of dopamine D2 and D3 receptors in Pavlovian conditioned approach behaviors. *Behavioral Brain Research*.
doi: 10.1016/j.bbr.2016.02.022

Haight, J.L., **Fraser, K.M.**, Akil, H., Flagel, S.B. (2015) Lesions of the paraventricular nucleus of the thalamus differentially affect sign- and goal-tracking conditioned responses. *European Journal of Neuroscience*.
doi: 10.1111/ejn.13031

Manuscripts in Preparation

Fraser, K.M., Read, J.P., La, T., Wu, Y., de Jong, J.W., Lammel, S. Striatal acetylcholine and dopamine comprise spatially heterogeneous channels for value.

Kim, T.H., **Fraser, K.M.**, Janak, P.H. Circuit-specific regulation of reward consumption by the central nucleus of the amygdala.

Kim, T.H., **Fraser, K.M.**, Janak, P.H. Ventral hippocampus, nucleus accumbens, and basolateral amygdala make distinct contributions to contextual biconditional discrimination performance.

HONORS AND AWARDS

2023	ACNP Travel Award
2021	Robert S. Waldrop Award for Outstanding Scholarship & Leadership, Johns Hopkins University
2020	Enoch Gordis Award Finalist, Research Society on Alcoholism
2019	Outstanding Poster Award, Winter Conference on Brain Research
2019	Travel Award, Winter Conference on Brain Research
2018	Trainee Professional Development Award, Society for Neuroscience
2018	Robert S. Waldrop Junior Investigator Award, Johns Hopkins University
2017	Special Opportunities for Undergraduate Learning Course Award, Johns Hopkins University

2017	Collaborative Research Award, Johns Hopkins University
2017	Walter L. Clark Service Award, Johns Hopkins University
2017	Honorable Mention, National Science Foundation GRFP
2015 – 2018	Owen Scholars Award, Johns Hopkins University
2014	Wilson P. “Spike” Tanner Memorial Award, University of Michigan
2014	Travel Award, Faculty for Undergraduate Neuroscience
2014	Literature, Science, and Arts Internship Scholarship, University of Michigan
2011	Michigan Schools and Government Credit Union Scholarship
2011	Michigan Education Association Scholarship
2011	National Multiple Sclerosis Society Scholarship

INVITED TALKS

(2024) Contexts control value encoding in the mesolimbic dopamine system. *Department of Psychology, Northeastern University, Boston, MA.*

(2024) Setting the occasion for motivated behavior. *Department of Psychological & Brain Sciences, Dartmouth College, Hanover, NH.*

(2024) Setting the occasion for motivated behavior. *Department of Psychology, University of Minnesota, Minneapolis, MN.*

(2023) Contexts control value encoding in the mesolimbic dopamine system. *Department of Neuroscience, Georgia State University, Atlanta, GA.*

(2023) Setting the occasion for motivated behavior. *Department of Psychology, Michigan State University, East Lansing, MI.*

(2023) Occasion setters control value encoding in the mesolimbic dopamine system. *Pavlovian Society Meeting, Austin, TX.*

(2023) Setting the occasion for motivation. *Department of Psychology, University of Michigan, Ann Arbor, MI.*

(2021) Setting the occasion for reward-seeking. *Department of Molecular and Cell Biology, University of California Berkeley, Berkeley, CA.*

(2021) Setting the occasion for reward-seeking. *Department of Neurobiology, Northwestern University, Evanston, IL.*

(2021) Setting the occasion for reward-seeking. *Intramural Research Program, National Institute on Drug Abuse, Baltimore, MD.*

(2020) Encoding and enhancement of the motivation to consume alcohol by the central nucleus of the amygdala. *Research Society on Alcoholism Annual Meeting*, virtual.

(2020) Dynamic coding of the motivational value of reward-paired cues in the limbic system. *Research Society on Alcoholism Annual Meeting*. *Canceled due to COVID

(2020) Encoding and enhancement of the motivation to consume alcohol by the central nucleus of the amygdala. *Gordon Research Seminar on Alcohol & the Nervous System*, Galveston, TX.

(2019) Setting the occasion for reward-seeking. *Department of Neuroscience*, University of Minnesota, Minneapolis, MN.

(2019) Cortico-amygdalar circuits for flexible cue-triggered motivation. *Winter Conference on Brain Research*, Snowmass, CO.

(2018) Setting the occasion for reward-seeking. *Central Atlantic Meeting on Associative Learning*, Princeton University, Princeton, NJ.

(2018) Setting the occasion for reward-seeking. *Molecular and Behavioral Neuroscience Institute*, University of Michigan, Ann Arbor, MI.

(2018) Setting the occasion for reward-seeking. *Department of Neurobiology*, University of Maryland Medical School, Baltimore, MD.

CONFERENCE ABSTRACTS

Fraser, K.M., Read, J.P., La, T., Wu, Y., de Jong, J.W., Lammel, S. (2024) Striatal acetylcholine and dopamine comprise spatially heterogeneous channels for reward and aversion encoding. *Society for Neuroscience*

Fraser, K.M., Collins, V., Wolff, A., Ottenheimer, D.J., Bornhoft, K.N., Pat, F., Chen, B.J., Janak, P.H., Saunders, B.T. (2023) Contexts facilitate dynamic expected value encoding in the mesolimbic dopamine system. *ACNP Meeting*

Fraser, K.M., Collins, V., Pat, F., Janak, P.H., Saunders, B.T. (2022) Hierarchical control of mesolimbic dopamine and striatal encoding of reward-paired cues governs behavioral flexibility. *Gordon Research Seminar/Conference on the Basal Ganglia*

Fraser, K.M., Collins, V., Pat, F., Janak, P.H., Saunders, B.T. (2020) Hierarchical control of mesolimbic dopamine and striatal encoding of reward-paired cues governs behavioral flexibility. *Society for Neuroscience*

Fraser, K.M., Collins, V., Pat, F., Janak, P.H., Saunders, B.T. (2020) Hierarchical control of mesolimbic dopamine and striatal encoding of reward-paired cues governs behavioral flexibility. *ACNP Meeting*

Fraser, K.M., Collins, V., Pat, F., Janak, P.H., Saunders, B.T. (2020) A role for mesolimbic dopamine and striatal encoding of reward-paired cues in the hierarchical control of behavior. *Pavlovian Society Meeting*

Kim, T.H., **Fraser, K.M.**, Janak, P.H. (2019) Ventral hippocampus, basolateral amygdala, and nucleus accumbens inactivation impairs cue responding in Pavlovian biconditional contextual discrimination. *Society for Neuroscience*

Fraser, K.M., Janak, P.H. (2019) Amygdalocortical circuits for the dynamic regulation of conditioned reward-seeking. *Society for Neuroscience*

- Janak, P.H., Kim, T.H., Ottenheimer, D.J., **Fraser, K.M.** (2019) Encoding and enhancement of the motivation to consume alcohol by the central nucleus of the amygdala. *Society for Neuroscience*
- Fraser, K.M.**, Janak, P.H. (2019) Role of nucleus accumbens core and shell in flexible cue-triggered reward-seeking. *Gordon Research Seminar/Conference on Catecholamines*
- Fraser, K.M.**, Janak, P.H. (2019) Amygdalocortical circuits for the dynamic regulation of conditioned reward-seeking. *Gordon Research Seminar/Conference on Amygdala Function*
- Fraser, K.M.**, Kong, E., Pat, F., Janak, P.H. (2019) Dynamic regulation of cue-triggered reward seeking by the basolateral amygdala and orbitofrontal cortex. *Society for Neuroscience*
- Fraser, K.M.**, Kong, E., Pat, F., Janak, P.H. (2018) Dynamic regulation of cue-triggered reward seeking by the basolateral amygdala and orbitofrontal cortex. *Society for Neuroscience*
- DiBartolo, M.M., **Fraser, K.M.**, Nicholas, V., Janak, P.H., Courtney, S.M. (2018) Incentive salience attribution predicts task-irrelevant attention biases in human sign- and goal-trackers. *Society for Neuroscience*
- Fraser, K.M.**, Janak, P.H. (2018) Setting the occasion for incentive motivation in the basolateral amygdala: implications for alcohol addiction. *Gordon Research Seminar/Conference on Alcohol and the Nervous System*
- Fraser, K.M.**, Janak, P.H. (2017) Extended experience does not alter the role of dopamine in the nucleus accumbens core, nor recruit dorsal lateral striatum, to facilitate Pavlovian cue-approach. *Society for Neuroscience*
- Fraser, K.M.**, Janak, P.H. (2017) Feature-positive occasion setting is dependent upon neuronal activity in the basolateral amygdala. *Pavlovian Society Meeting*
- Fraser, K.M.**, Janak, P.H. (2017) Dorsal and ventral striatal systems and the attribution of incentive salience to reward-paired cues. *Gordon Research Seminar/Conference on Catecholamines*
- Haight, J.L., Fuller, Z.L., **Fraser, K.M.**, Flagel, S.B. (2016) Differential activity in the circuitry of the paraventricular nucleus of the thalamus following presentation of an incentive vs. a reward-predictive stimulus. *Society for Neuroscience*
- Richard, J.M., Armstrong, A., **Fraser, K.M.**, Janak, P.H. (2016) Role of ventral pallidum in conditioned alcohol seeking and the effect of stress. *Research Society on Alcoholism*
- Fraser, K.M.**, Haight, J.L., Gardner, E.L., Flagel, S.B. (2015) Investigating contributions of dopamine D2 and D3 receptors to Pavlovian conditioned approach behaviors. *Society for Neuroscience*
- Haight, J.L., **Fraser, K.M.**, Flagel, S.B. (2015) Differential activity in afferents and efferents to the paraventricular nucleus of the thalamus. *Society for Neuroscience*
- Covelo, I.R., Haight, J.L., **Fraser, K.M.**, Kuhn, B.N., Ferguson, S.M., Flagel, S.B. (2015) Chemogenetic manipulation of prelimbic afferents to the paraventricular nucleus of the thalamus alter cue-oriented responses in a Pavlovian conditioned approach task. *Society for Neuroscience*
- Haight, J.L., **Fraser, K.M.**, Akil, H., Ferguson, S.M., Flagel, S.B. (2015) Establishing a role for cortico-thalamic circuitry in cue-driven behaviors. *IBNS meeting*
- Haight, J.L., **Fraser, K.M.**, Akil, H., Ferguson, S.M., Flagel, S.B. (2015) Establishing a role for the paraventricular nucleus of the thalamus in Pavlovian conditioned approach behavior. *Winter Conference on*

Brain Research

Haight, J.L., **Fraser, K.M.**, Akil, H., Ferguson, S.M., Flagel, S.B. (2014) Parsing the role of the paraventricular nucleus of the thalamus in mediating individual variation in incentive salience attribution. *ACNP Meeting*

Fraser, K.M., Haight, J.L., Flagel, S.B. (2014) Stimulation of dopamine D3 receptors attenuates the expression of Pavlovian conditioned approach responses and motivation for incentive cue presentation. *Society for Neuroscience*

Haight, J.L., **Fraser, K.M.**, Akil, H., Flagel, S.B. (2014) Lesions of the paraventricular nucleus of the thalamus differentially affect the acquisition and expression of Pavlovian conditioned responses. *Society for Neuroscience*

Fraser, K.M., Haight, J.L., Flagel, S.B. (2014) Stimulation of dopamine D3 receptors attenuates the expression of Pavlovian conditioned approach responses and motivation for incentive cue presentation. *Department of Psychology Research Symposium, University of Michigan*

IN THE MEDIA

Dopamine, Explained <https://www.vox.com/future-perfect/24159087/what-is-dopamine-hacking-fasting-does-it-work-science>

Highlighted researcher by the NIH BRAIN Initiative <https://braininitiative.nih.gov/news-events/blog/researcher-spotlight-f32-recipient-dr-kurt-fraser>

“Training the Next Generation of Reviewers” <https://www.sfn.org/Publications/Neuroscience-Quarterly/Winter-2019/SfN-Journals>

“Quality in Peer Review” <https://blog.eneuro.org/2019/09/peer-review-week>

PEER REVIEWING

Invited Peer Reviewer: *Behavioral Neuroscience, Journal of Neuroscience, Psychopharmacology, Neuropsychopharmacology, Scientific Reports, eNeuro, Behavioral Brain Research, Journal of Experimental Psychology: Animal Learning & Cognition, Neurobiology of Learning & Memory, Frontiers in Behavioral Neuroscience, Frontiers in Neuroscience, Learning & Memory, Brain Structure & Function, Current Opinion in Behavioral Sciences*

Ad Hoc Assistant Reviewer: *Addiction Biology, Biological Psychiatry, Nature Neuroscience, Nature Nanotechnology*

TEACHING EXPERIENCE

Fall 2022 **Neuroscience of Stress and Reward**
Guest Lecturer
Stanford University

Summer 2022 **Exploring the Brain: Introduction to Neuroscience**
Guest Lecturer
University of California Berkeley

Winter 2021 **Behavioral and Cognitive Neuroscience**

	Guest Lecturer Icahn School of Medicine at Mount Sinai
Winter 2020	Behavioral and Cognitive Neuroscience Guest Lecturer Icahn School of Medicine at Mount Sinai
Winter 2019	How Does the Brain Predict the Future? Guest Lecturer Johns Hopkins University
Winter 2019	Neuroscience of Motivation and Reward Guest Lecturer Johns Hopkins University
Winter 2018	Neuroscience of Motivation and Reward Teaching Assistant Johns Hopkins University
Fall 2017	Setting Up for Success in Systems Neuroscience Instructor Johns Hopkins University
Winter 2017	Sleep, Dreams, and Altered States of Consciousness Teaching Assistant Johns Hopkins University
Fall 2016	Advanced Statistical Methods Teaching Assistant Johns Hopkins University
Fall 2016	Psychobiology of Addiction Guest Lecturer Johns Hopkins University
Winter 2016	Neuroscience of Motivation and Reward Teaching Assistant Johns Hopkins University

MENTORSHIP EXPERIENCE

Lammel Lab, 2021-present

Mentorship of 3 Honors undergraduate students, 2 graduate students, 1 postbacc fellow

Janak Lab, 2015-2021

Supervised 3 undergraduate Honors thesis projects, mentored 3 graduate students, 2 visiting students

SERVICE

2023 – present

Scientific Committee Member

Monitoring Molecules in Neuroscience (MMiN) 2024 Meeting

2023 – present

Postdoctoral Representative

Neuroscience Division, Department of Molecular and Cell Biology

University of California Berkeley

- 2019 – 2023 **Chair**
Gordon Research Seminar on Amygdala Function
- 2020 – 2021 **Chair**
Climate Committee, Department of Psychological & Brain Sciences
Johns Hopkins University
- 2019 – 2021 **Organizer**
LGBTQ+ Social
Society for Neuroscience
- 2019 **Panelist**
Power Hour
Gordon Research Conference on Catecholamines
- 2019 **Discussion Leader**
Gordon Research Seminar on Amygdala Function
- 2018 **Co-chair**
Outreach Committee, Department of Psychological & Brain Sciences
Johns Hopkins University
- 2016 – 2019 **Coordinator**
Baltimore Brain Series
- 2016 – 2017 **Chair**
Colloquium Committee, Department of Psychological & Brain Sciences
Johns Hopkins University
- 2016 – 2017 **Student Representative**
Admissions Committee, Department of Psychological & Brain Sciences
Johns Hopkins University
- 2016 – 2018 **Volunteer**
Brain Awareness Day at Baltimore Polytechnic Institute
Johns Hopkins University
- 2014 – 2015 **Volunteer**
BrainsRule! Neuroscience Youth Outreach Day
University of Michigan
- 2013 – 2015 **Peer Mentor**
Office of New Student Programs
University of Michigan

PROFESSIONAL MEMBERSHIPS

- 2019 – present Research Society on Alcoholism
- 2018 – present Associate Faculty Member, F1000

2017 – present Pavlovian Society
2014 – present Society for Neuroscience

REFERENCES

Stephan Lammel, PhD

Associate Professor of Molecular and Cell Biology
University of California Berkeley
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Patricia H. Janak, PhD

Bloomberg Distinguished Professor of Psychology & Neuroscience
Johns Hopkins University
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University of Michigan
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Peter C. Holland, PhD

Emeritus Professor of Psychology & Neuroscience
Johns Hopkins University
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Mark G. Baxter, PhD

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Wake Forest University School of Medicine
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